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UNITED STATES DEPARTMENT OF AGRICULTURE

DEPARTMENT BULLETIN No. 1261

Washington, D. C. July 22, 1924

OPERATING METHODS AND EXPENSE OF COOPERATIVE CITRUS-FRUIT MARKETING AGENCIES

By

A. W. McKAY, Specialist in Agricultural Cooperation, and W. MACKENZIE STEVENS
Formerly Associate Marketing Specialist, Bureau of Agricultural Economics

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Citrus-fruit growers of California have been marketing their fruit cooperatively for over 30 years. The stability of the cooperative associations that form the California Fruit Growers Exchange and the success with which they have solved various complex marketing problems make a study of the federation of more than usual value. The organization and development of the exchange have been described in an earlier bulletin.[1] This bulletin describes the operating methods of the local associations and discusses the factors which enter into the expense connected with the preparation of citrus fruit for market. Other marketing costs are treated briefly.

ORGANIZATION OF THE EXCHANGE SYSTEM.

The first cooperative citrus-fruit associations in California were organized in 1892. Three such organizations operated during the season 1892–93 and were believed by their members to furnish a much more satisfactory method of marketing citrus fruit than had hitherto been employed. During the summer of 1893 other local cooperative associations were formed and these associations were federated into seven district exchanges. The district exchanges adopted a common plan for marketing the citrus fruit of their member associations. It was decided that each exchange should market the crop of its members independently but that the sales policies of the exchanges should be coordinated through an executive board to meet in Los Angeles weekly during the shipping season.

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[1] A detailed description of the organization of the exchange system and the development of the organization will be found in Department Bulletin 1237, Organization and Development of a Cooperative Citrus-Fruit Marketing Agency.

The district exchanges operated independently for two seasons, except in so far as their activities were coordinated by the executive board. In the fall of 1895 the Southern California Fruit Exchange was organized. This exchange continued to operate until 1905, when its name was changed to the California Fruit Growers Exchange under which title it now operates.

The California Fruit Growers Exchange is made up of 192 independent local units (May 1, 1923). For the most part these are local cooperative associations. Possibly 20 per cent are corporations or individuals who pack fruit from their own orchards, or companies engaged in the business of packing fruit for growers. All except 18 of the local units are federated into district exchanges. There are 20 district exchanges at the present time with a membership of from 2 to 20 local organizations. Each local organization controls the harvesting and packing of the fruit of its members. The local associations are incorporated, many owning property valued at $300,000 or more and doing a business up to $1,000,000 annually. Each local unit nominates a director or directors on the board of the district exchange with which it is affiliated. The district exchange nominates a representative who is elected a director of the California Fruit Growers Exchange. The California Fruit Growers Exchange is accordingly governed by a board of 20 directors, one from each district.

Local associations or other organizations not affiliated with a district exchange are known as direct contract shippers. The direct contract shippers are not represented on the board of directors, but in other respects their status is the same as that of the units which make up the district exchanges.

The local associations and other organizations affiliated with the California Fruit Growers Exchange also own the stock of a purchasing organization known as the Fruit Growers Supply Co. This company was formed in 1907 for the purpose of securing the supplies essential to the packing and marketing of citrus fruit. It also purchases orchard and miscellaneous supplies for the members of the local associations and other organizations, which are its stockholders. The 20 directors of the California Fruit Growers Exchange are also directors of the Fruit Growers Supply Co. The Fruit Growers Supply Co. is not a subsidiary of the California Fruit Growers Exchange, but an organization formed by the associations to purchase packing-house supplies, while the exchange is an organization formed by the same associations to provide facilities for the marketing of their citrus fruit.

In a similar manner, a certain number of the lemon associations affiliated with the exchange have organized a lemon by-products company, known as the Exchange Lemon Products Co., and the associations shipping oranges have organized a company known as the Exchange Orange Products Co. The associations are the stockholders of these corporations and control them independently of the

California Fruit Growers Exchange. These companies are organized for the purpose of manufacturing various products from oranges and lemons, which are not of sufficiently high quality to be shipped as fresh fruit.

The number of cars and the total value of California citrus shipments from 1910 to 1922 are shown in Figure 1. At the present time approximately 75 per cent of the citrus fruit shipped from California is sold through the California Fruit Growers Exchange. Shipments of the exchange during the 12-month period ended October 31, 1923, exceeded 45,000 cars, and returns to the associations affiliated with it exceeded $55,000,000. Purchases of the Fruit Growers Supply Co. exceed $10,000,000 annually and the by-products companies converted 10,000 tons of lemons and 15,000 tons of oranges into various by-products during the year ended October 31, 1922.

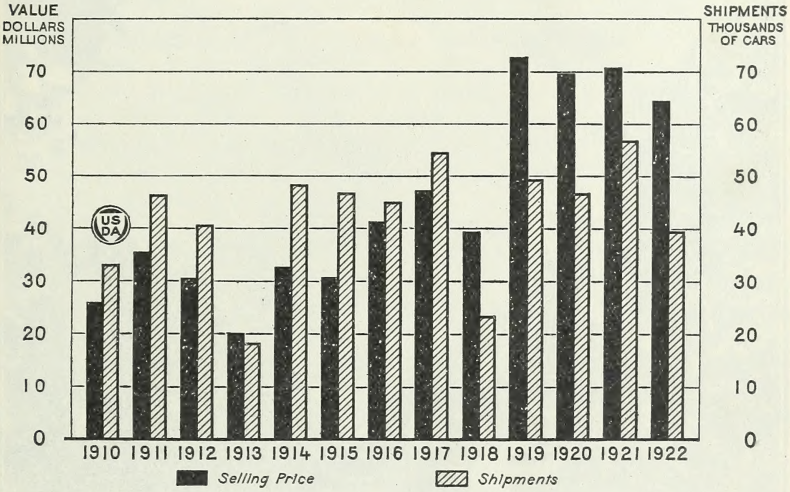

Fig 1.—Carloads and total shipping-point value of California citrus shipments, 1910–1922

HARVESTING OPERATIONS AND EXPENSE.

The fruit owned by the members of an association is picked by a crew employed by the association, and under the direction of a foreman or field manager who is responsible directly to the manager of the association. (See fig. 2.)

The harvesting problem is two-sided: (1) The fruit must be handled carefully at all times; and (2) each picker must pick a sufficient quantity to keep labor costs within reasonable limits. A desirable relation between the quality and quantity of work performed by a picking crew is secured through efficient supervision, and by a system of wage payment that encourages both rapid and careful work. Several associations now employ a quantity-quality bonus system of paying pickers.

Inspection of the work of each picker is made at least once a day. Frequently a picking inspector is employed who checks the work of all crews employed by the association and visits each crew two or three times each day Other associations have the inspections made by the crew foreman supplemented by a daily inspection by the general field foreman, who is responsible for the work of all crews employed by the association. These inspections are necessary, because of the minute character of some injuries which would later cause decay.

Orchards are generally picked in rotation to avoid the transfer of crews and equipment over long distances. If a grower does not wish to have his fruit picked at the time allotted to him in the schedule, he must wait until the crew has completed the round. Three pickings of oranges are usually made. At the first picking, such oranges as show desirable size and color are removed from the trees. The second picking takes the greater part of the crop, leaving only such oranges as are still undersized. These are picked later.

FIG. 2.—The cooperative associations have taken a leading part in preventing decay of citrus fruit by careful handling in the orchards

The situation is somewhat different with lemons. Lemons are harvested every month of the year, although the heaviest yields are obtained during the fall and winter. Fruit of the most desirable quality is that which is picked while still green. Lemons are therefore picked as soon as they attain a desirable size. Each picker is furnished with a ring of the required diameter and he picks all lemons which will not pass through this ring, unless the lemons are "tree ripe"; that is, have attained a yellow color on the trees. When this occurs, the fruit is picked without regard to size.

Picking expense includes the actual labor cost and a fixed amount to cover the general foreman's salary and the depreciation of equipment. In a few associations this fixed charge is pooled or carried as a general association expense. In one or two instances all picking charges are pooled, and in a few a part of the direct-labor charge is carried as a general association expense.

The most general practice is to deduct the cost of picking from money due the grower for his fruit. Some associations, however, insist that this charge shall be paid in cash by the grower, and deduct it from the returns only when the grower is delinquent. At least one association bills picking charges to its members payable in 15 days, and adds interest at the rate of 1 per cent a month after the account is due.

Under conditions in 1921 it cost between 17 and 20 cents per field box to harvest lemons by association crews, and between 7 and 10 cents per field box to pick oranges. The higher cost of picking lemons is caused by the slower progress made by the picker. Lemons are smaller on the average than oranges, the trees must be gone over 8 to 10 times in a season, and the fruit selected each time for size and color.

Picking costs, aside from these differences between oranges and lemons, depend upon the size or age of the trees, the size and quality of the crop, the general wage level, and the efficiency of the management. Picking costs are nearly twice as high as they were five or six years ago. Wages were apparently slightly lower in 1921 than in 1920, but picking costs per box of oranges increased in 1921, primarily because of the smaller crop. The increase in picking expense in 1913 was caused by a freeze which reduced the yield per tree and injured the quality of the fruit. The picking expense shown in Table 1 includes the picking foreman's salary, the expense of transferring crews from one orchard to another, depreciation of picking boxes, and similar items.

TABLE 1.—*Average picking expense per field box of a group of representative orange and lemon associations, seasons of 1911–1921.*

Season	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Oranges	5	5	6	5	4	4½	5	5	7	7½	9
Lemons	13	12½	15	14	13	12	13	18	20	22	20

Picking costs per packed box are considerably higher than the cost per field box. The fruit is packed compactly for shipment, consequently a packed box contains more fruit than the field box. There is loss of weight from culling, and with lemons, loss from the necessary curing process. Investigations of the exchange indicate average picking costs of 13 cents per packed box for oranges and 36.4 cents for lemons in 1921.

There is a wide variety of practice with regard to hauling fruit from the orchards to the packing house. Many associations have one or more trucks, and haul a part of the fruit of their members. The remainder is either hauled by the growers, or by transfer trucks hired by the growers or the association. The association's charges for hauling, as for picking, are intended to cover actual cost of labor, maintenance of trucks, depreciation, and fuel and oil expense. A sliding-scale charge is usually made; for example, 2½ cents per field box for the first mile and 1 cent per box for each additional half mile.

In most associations the trucks are used for commercial hauling at seasons when they are least in demand for hauling fruit, to reduce operating expenses. The net cost to the average grower for hauling fruit is thus reduced to 2½ to 3½ cents per field box, although wide variations exist, caused principally by the varying distances between orchards and packing houses. Investigations of the California Fruit Growers Exchange show the approximate average cost per packed box for hauling citrus fruit from the orchards to the packing houses to be as shown in Table 2 for the years indicated:

TABLE 2.—*Cost of hauling fruit per packed box.*

	1910	1918	1920	1921
	Cents.	*Cents.*	*Cents.*	*Cents.*
Oranges	2.9	3.7	4.9	4.6
Lemons	3.9	5.6	6.7	5.7

PACKING-HOUSE OPERATION.

A representative local unit of the exchange system is a cooperative association of from 50 to 200 growers, each owning on the average less than 10 acres of bearing orchard. It is to organizations of this kind that the discussion in this section chiefly refers, although it is applicable in general to individual shippers and packing companies affiliated with the exchange.

MANAGEMENT.

All except a few of the smallest associations or associations which have an exceptionally short shipping season are under the direction of a manager who devotes his entire time to the business of the organization. The packing-house work is under the immediate direction of a foreman, who may have one or more subforeman under him. The field work is often under the direction of a general field foreman, under whom are picking-crew foremen; but frequently the manager also controls the field work, and the foremen of the picking crews are responsible directly to him. In some cases, especially in central California, two or more associations unite to employ a manager, who, under these conditions, is usually paid a fixed amount per box for his services and for furnishing the necessary office help, instead of a definite salary. In most associations, however, the manager, the foremen, the bookkeeper, and other office help are paid definite salaries for 12 months of the year.

Direct responsibility for all packing-house operations rests upon the manager. The manager of an association must be a man of considerable business ability, experienced in the handling, grading, and packing of citrus fruit, and his personality must be such as to inspire the confidence of the members of the association. Although the board of directors must pass upon all questions of general policy, such policies should be initiated by the manager. In the exchange system it is possible to find extremes in the amount of authority given the manager. In some exceptional instances the manager is virtually a dictator; in others his powers and authority are extremely limited. In most cases, however, the manager does not attempt to put into effect changes that lack the support of the directors and stockholders, although he properly takes the lead in determining policies. The general principles of successful management which obtain in all commercial enterprises apply to this field, and have been discussed so frequently that no elaboration is required.[2]

SPECIAL OPERATING PROBLEMS.

Careful Handling.

The value of a perishable agricultural product may be greatly reduced if careless harvesting and packing methods are employed. An important function of the packing-house manager and his assistants is to insure the uniformly careful handling of the fruit. After the fruit is received at the packing house, it is handled largely by machinery, and the human element is a less important factor than in the harvesting operations. Nevertheless, considerable injury may be caused by graders and packers, unless they are carefully instructed and supervised. In addition, the packing-house machinery must be of such kind and must be kept in such condition of repair that the fruit will not be injured in the various operations.

The purpose of the general insistence on care is to reduce to a minimum decay in transit and on the market. Under careless handling conditions, a blue mold fungus may be the cause of heavy loss. As this is practically the only fungus that causes commercial decay of California oranges, and is by far the most serious of the various fungi attacking lemons, its elimination goes far toward solving the decay problem.

The loss from decay in transit, or, in the case of lemons, in storage and transit, is a deduction from the receipts of the growers concerned. Lemons that decay in the curing room are not subject to packing, freight, or selling charges; but the sound fruit must pay a larger proportion of the expense of sorting and handling, on account of the necessary removal of the decayed fruit. Oranges or lemons that decay while en route to market have been subject to all handling charges, to the selling charge of the central organization, and to transportation charges. Such decay is a direct loss to the producer. Furthermore, although the shipper may make an "allowance" to the car-lot buyer on account of decay, the buyer must get the same margin, on the average, for handling a box of oranges with 10 per cent decay as for one which is sound. The consumer therefore pays proportionally more for the sound fruit.

In addition to this direct loss, there is an indirect loss which is equally important. A brand or association may quickly obtain an unenviable reputation for shipping fruit of poor keeping quality. The jobber must not only discount the decay which actually appears in the shipment when it arrives at market, but he must make allowance for the possibility of further loss while it is in his hands and for possible complaints from the customers to whom he sells it. As long as oranges or lemons packed under a certain brand are uncertain in keeping quality, he will handle them only at a discount, even in those instances where a particular car arrives sound. A large element of speculation is introduced into the transaction; and the history of the industry has shown that, in so far as such conditions become general, lower prices to the producers, higher prices to the consumers, and a general curtailing of distribution and consumption prevail.

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[2] See Cumberland, W. W., Cooperative Marketing, pp. 80-81. 1917.

STANDARDIZED GRADES.

Of similar nature is the policy of standardized grades, which in the exchange system has been largely developed about the advertised trade-mark "Sunkist." Only fruit which grades "fancy" or "extra choice" can be shipped under this trade-mark, and grade specifications are issued for "Sunkist" fruit, which are maintained by frequent inspections by representatives of the field department of the exchange. Similarly, the "choice" grades of oranges and lemons are sold under the advertised trade-mark "Red Ball". "Standards", which are really a third grade, can not be packed under either of the advertised trade-marks, but must be sold under an association brand, or unbranded. Neither the "Sunkist" nor "Red Ball" trade-mark supersedes the association brands. The brands of the associations, although generally unknown to the consumers, have a recognized standing among the car-lot buyers. The "Sunkist" trade-mark design, therefore, is generally made a part of the brand design of the associations' box label, and is displayed prominently on the wraps.

Oranges and lemons are graded with two objects in view: (1) To remove fruit which is mechanically injured, injured by insects, or damaged by frost or other means, so that its eating or keeping quality is adversely affected; (2) to separate fruit which varies widely in general appearance, texture, color, and other factors that distinguish the higher from the lower grades. The fruit in the third grade may be just as good from the consumer's standpoint, except for the factor of appearance, as that in the first grade. The fact remains, however, that a large class of consumers demand fruit which is attractive in appearance as well as of good quality, and are willing to pay a higher price for fruit of this kind. Other consumers, although they demand good quality, are not so particular regarding the appearance of the fruit; or, rather, they will sacrifice appearance for a concession in price.

Efficient merchandising demands that oranges and lemons be graded to meet the demands of these various classes of consumers. Furthermore, the demands of the jobbers and retailers, reflecting those of the consumers whom they serve, are frequently for a particular grade. At any rate, fruit packed "orchard run" can not be handled to advantage, and such a mixed lot will probably be sold at the average price of the lowest grade represented.

The practice of grading fruit, especially citrus fruit, was established early in the history of the industry. Only within recent years, however, have grades been so standardized that, for example, the choice grade of one association could be said to be approximately the same as the choice grade of another. It is not possible, even with the complete system of inspection maintained by the exchange, to secure absolute uniformity between the grades of all associations. Soil and climatic conditions affect the texture and general appearance of the fruit, and the human element necessarily gives rise to minor variations. The grade standards of the exchange provide for a tolerance of 10 per cent in the higher grades and 5 per cent in the choice grade, so that within these limits practical uniformity is secured.

The value of standardized grades from the point of view of buyer and seller is obvious. The salesman knows that fruit of a certain grade approximates at least a certain standard of appearance and quality, no matter who is the shipper. He can determine the value of the shipment with reference to market demands for fruit of a similar grade. The buyer, on the other hand, knows without the necessity of a detailed inspection that he is buying fruit of a particular grade, and is assured that the shipment will satisfy his customers' requirements. The result is that sale and distribution of the fruit are greatly facilitated, the confidence and good-will of the buyers are secured, and the speculative element in marketing is reduced to that extent.

POOLS AND PAYMENTS TO GROWERS.

In all associations the fruit of the growers is either pooled over a certain period, sometimes covering the entire shipping season, or it is agreed that a certain percentage of each grower's fruit shall be picked and sold in a pool. All returns received for fruit of the same grade (in some cases size distinctions also are made) during the pooling period, after deductions for packing, marketing, and other expenses, are averaged and the grower is paid the average price per pound or per box received during that period for fruit of the grade or grades which he had delivered. All expenses connected with the handling and marketing of the fruit are pooled, with the general exception of picking and hauling charges.

The system of pooling orange and lemon shipments arose from the inherent difficulties in handling and marketing a large number of small lots as separate units. Even if it were practicable to segregate the fruit of each grower, in all probability no one of them would have sufficient fruit to load a car. Each car would contain the fruit of a number of growers, which would be sold at a uniform price per box for each grade in most instances, and the returns to that extent would be pooled. However, it is manifest that packing-house operation is facilitated and that accounts and returns are simplified, when all the fruit shipped during a particular period is handled as a unit.

From the standpoint of the producer, the greatest value of pooling lies in the insurance against loss which it affords him. Under any system of handling and marketing a perishable product loss in certain shipments can not be avoided. A car may be delayed in transit, or some other condition may arise causing heavy deterioration in the shipment, which the grower or the packer could not prevent. Or the shipment, although in sound condition, may experience unfavorable market conditions. If such a car contained the fruit of a single grower, his entire receipts for the season might be wiped out. When the loss is distributed among all the shippers in a pool, under ordinary conditions no hardship is incurred.

The pooling system also permits the association manager to handle the crop in such a way that labor will be employed most efficiently and economically. At the same time he is able to conform reasonably closely to the distribution schedule of the central organization. This is seldom possible when shipments are not pooled. There is always a period during the season when the demand is more active than at other times, or when it is expected that there will be an active demand and relatively high prices. Every grower is anxious to ship at this time, and, on the contrary, has no desire to ship when prices are low, or when there is the expectation of low prices. This desire on the part of the growers to secure the highest market price often defeats itself. If everyone ships when higher prices are expected, excessive supplies will hold prices at a low level. Shipments must be made in accordance with the actual or anticipated demand, otherwise disastrous market gluts or market shortages are inevitable. Efficient distribution can be secured much more easily under the pooling system than under a system of individual returns.

Oranges and lemons are always pooled by grade. As a rule, the proportion contributed by each grower to a pool is determined by securing the weight of the fruit with the culls eliminated. Some associations pool not only by grade but by size. In such cases three sizes only are considered: "Large-off" (larger than 126), "standard" (126 to 216), and "small-off" (smaller than 216). This means that each lot of fruit must be packed and the number of boxes and sizes checked before a second lot is sized. Associations which do not pool by size claim that any disparity in sizes is equalized over the season, or at least over three or four seasons, and that the results do not justify the additional labor and records required. Although the pool records are secured on the basis of the weight of the fruit contributed by each grower, these are sometimes converted into packed boxes when returns are made.

Lemons, like oranges, are weighed immediately after they are graded, and returns to the growers are made on the basis of these weights. Lemons, as a rule, are pooled over approximately a six-weeks period, or whenever the picking crews have gone over all orchards in the association. In other words, "a pick is a pool." Some associations make a season's pool for Washington Navel oranges and another for Valencia oranges, and in some instances lemons are pooled for the season. Where this is done, partial payments are made to the growers from time to time. Such payments are a percentage of the estimated returns for the season. At the end of the season or at the end of the fiscal year final settlement is made with all members of the association. If fruit is graded and weighed within a certain pooling period, it is included in that pool, although it may not be shipped until one or two days after the pool has closed. The date of sale does not determine the pool in which the fruit shall be included.

REGULAR PACKING-HOUSE OPERATIONS.

Oranges, as received from the orchards in field boxes, are weighed and the weights recorded. The fruit of the various growers is held in separate stacks. When a sufficient supply of one grower's fruit has accumulated, it is trucked to the washer, and the field boxes are emptied, usually automatically, into a long tank filled with water. The fruit is carried from the tank to the washer, which, in most packing houses, consists of a series of long revolving brushes about a foot in diameter. (See fig. 3.) The fruit passes between these brushes to the drier, an inclosed belt or roller conveyor about 5 to 6 feet in width. The fruit is carried slowly through the drier, and a strong current of air is blown over it by large fans. The driers average about 50 feet in length.

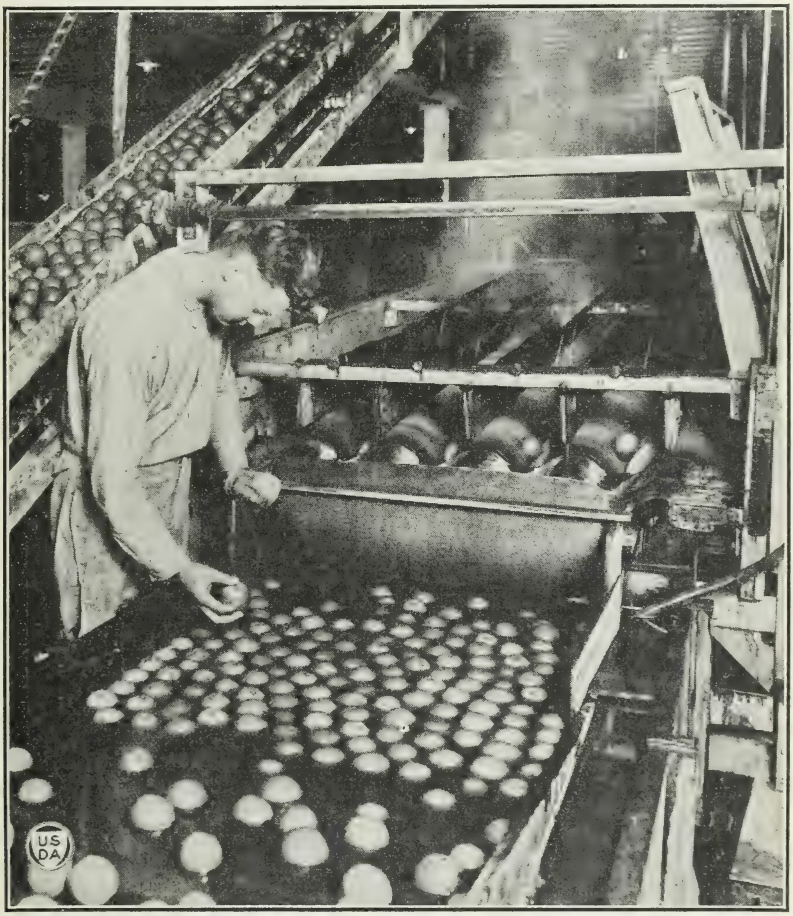

FIG. 3.—A process that was formerly the source of much injury to the fruit and its infection with the spores of fungi, causing decay. The improved machinery and methods used by the cooperative associations have eliminated this difficulty.

GRADING, SIZING, AND PACKING ORANGES.

From the drier, oranges are carried to the "grading belt." The grading belt is in reality a series of canvas belts, moving at a moderate rate of speed, and divided into several longitudinal sections. The graders, four or five in number, separate the various grades and place the fruit of each grade in the proper section of the belt. The first grade is carried to the "sizer" reserved for this grade, and the second and third grades to other sizers.

Orange sizes are described, according to the number required to pack a standard box, as "150's," "176's," etc. The so-called standard sizes are 126, 150, 176, 200, and 216. As a rule, sizes in a particular lot of fruit range from 96 to 252, but a large proportion of these are standard sizes. Seasonal conditions, however, may result in a crop with an undue proportion of large or small sizes. The marketing of "off sizes" is one of the difficult problems confronting shippers of citrus fruits.

Oranges are neatly wrapped and packed according to a standard plan. (See fig. 4.) All first and second grade fruit is wrapped in strong tissue paper bearing the brand name or trade-mark under which the fruit is packed. The fruit is packed solidly, and must be 1½ to 2 inches above the top of the box. This "bulge" allows for shrinkage and settling of the fruit in the box while it is en route to market and assures a full package at destination. After covers are nailed on the boxes, they are carried by hand trucks either directly into the car, or precooling room, or are stacked in the packing house until loaded.

Grading and Packing Lemons.

The handling of lemons in the packing house is a longer and more involved process than is necessary for oranges. Lemons are delivered at the packing house in field boxes, and are washed shortly after they are received. The fruit of each grower is weighed as it is received, and is stacked. After it is washed the fruit is separated according to color. The keeping quality of the fruit is determined in part by the color at the time it is picked, and color is also an indication of the length of time it must be cured before shipment.

The most desirable fruit is dark green when picked; but light green lemons may be of equally good quality, although they can not be stored for as long a period. "Tree-ripe" lemons are those which have attained a deep yellow color on the tree. Fruit of this grade must be shipped within two or three weeks after it is harvested.

Light green fruit is usually cured for about a month but may be held for two months without great danger of loss. Dark green fruit is generally well cured in six weeks, and present practice is to ship it at about the end of this period. However, dark green lemons have been held in the curing room as long as five to six months, and formerly three months was not an exceptional period to hold this class of fruit. At the end of the curing period lemons that were light or dark green when first stored are a light yellow color, the skin has become thin and flexible, and the juice content of the fruit has increased greatly.

Lemons are placed loosely in packing boxes after they are washed and are transferred with hand trucks to the curing rooms. Often the fruit is cured in basement rooms, but sometimes a portion of the main floor of the packing house is also used as a curing space. The identity of each lot of fruit is maintained during the curing process.

In the grading room the fruit is sorted after curing into shallow wooden trays and separated into the various grades which the asso-

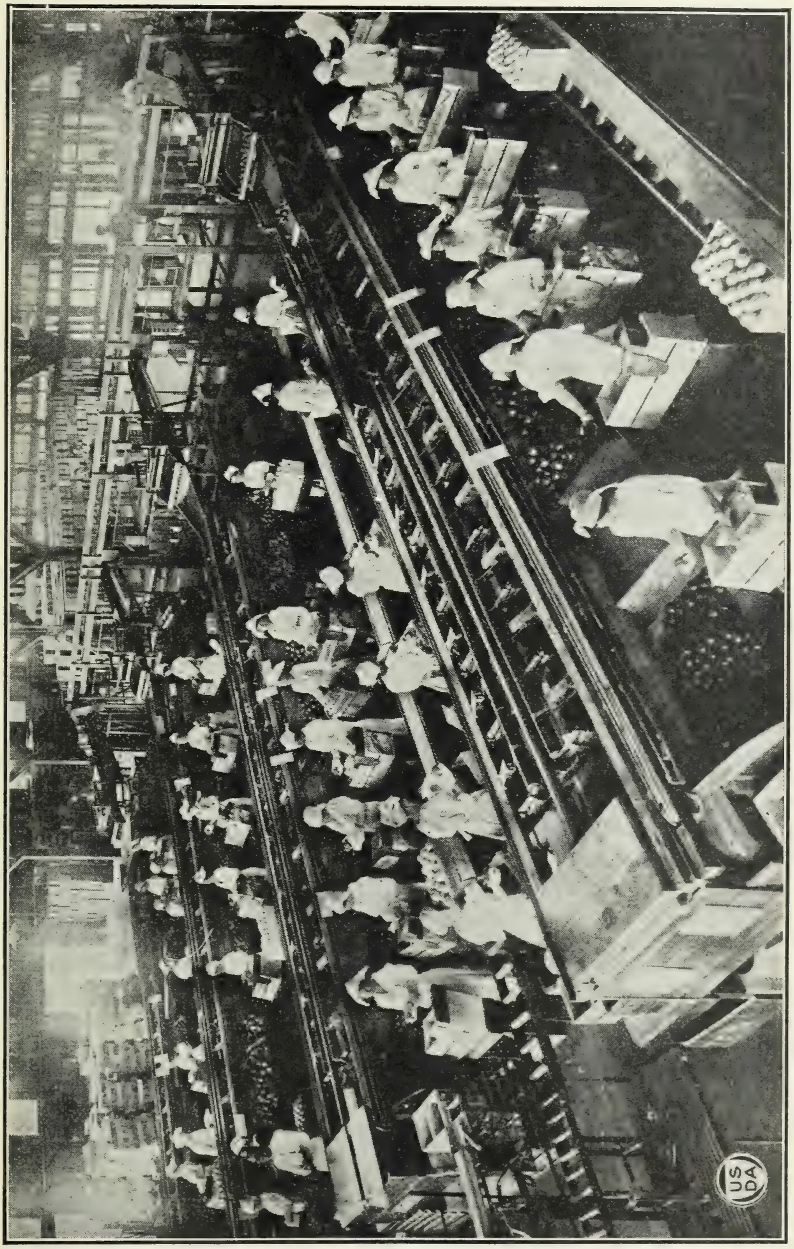

FIG. 4.—Four "sizers" are shown with the grading belts in the background. The clean, well-lighted room and the improved machinery employed contrast strikingly with the packing houses and equipment of earlier days

ciation ships. The fruit is again weighed and loses its identity at this point. Each grower is paid on the basis of the weight here recorded. The trays are trucked, or in some instances moved by conveyors, to the packing room.

Mechanical sizers for lemons have been only indifferently successful on account of the irregular shape of the fruit, and lemons are almost universally sized by hand labor. More skill and time is required to pack a box of lemons than a box of oranges on account of the irregular shape of the lemon, the fact that the fruit is uniformly smaller, and because the packer must select the fruit according to size. Labor costs for this operation average 11 cents per box, compared with 5½ cents for packing oranges. Lemon sizes range from 270 to the box, sometimes larger, to 442, 490, or smaller. The so-called standard sizes, 300 and 360, comprise the larger proportion of the fruit shipped. The 270 size is fairly common, and a small percentage in a shipment is not objectionable on many markets. Because lemons are sized roughly when they are picked, there are comparatively few commercial sizes.

Loading Orange and Lemon Shipments.

Orange boxes are loaded on end, two layers high, and six or seven rows wide across the car. The standard refrigerator car will hold 33 such stacks, and the load will then consist of 396 or 462 boxes, depending upon whether it is six or seven rows wide. Lemons are generally shipped in ventilated cars and in no case are precooled. The load is the same as for oranges, except that on account of the greater width of the box a fewer number of stacks can be loaded lengthwise in the car.

PACKING-HOUSE LABOR.

For the most part Americans are used for packing-house labor, although Japanese and Mexicans are occasionally employed. All packing-house help, except the packers, are paid on an hourly basis. The rate of pay during 1922 averaged about 45 cents per hour. Subforemen, or men holding positions entailing some responsibility, were paid 50 to 55 cents, and positions requiring skill and experience, such as that of "pressman," box maker, or car loader, at the rate of about 50 cents per hour. The packers are practically always paid by the box, with a higher rate for lemons than for oranges. Frequently there is added to the rate per box an extra amount (one and a half, or twice the usual rate) for small sizes or for fruit packed during overtime. Again, a bonus of half a cent per box may be paid to packers who remain with the association throughout the season. It was noted that where a bonus of this kind was paid the packers received somewhat less than those employed on a straight box basis at near-by points. Orange packers are paid from 4½ to 5 cents per box, and lemon packers from 8 to 9 cents. Women are generally employed as packers

PACKING-HOUSE EXPENSE.

The operating methods of the associations are fairly uniform. There are differences, however, in the efficiency with which these methods are applied, and in this section, so far as the data permit, some of the factors that make for efficient operation are analyzed. Efficient operation may be measured partially by the net returns received by the members of an association. Local soil and cultural conditions, varieties grown, and the harvesting season also have considerable influence on the final returns to the growers, and any comparison of net returns must take into consideration the effect of these and other factors.

Packing costs are only a partial index of the efficiency of the management. In some instances a low cost, particularly a low labor cost, may be secured at the expense of careful handling, grading, or packing, operations which directly affect the value of the fruit and the net returns of the producers. However, it is probably more often true that the same care and watchfulness on the part of the management which keep packing expense at a minimum also promote the effective performance of the various packing-house operations. This study indicates that in many instances economies in packing-house expense (Tables 3 and 4) could be secured without impairing operating efficiency.

TABLE 3.—*Detailed statement of orange packing-house expense per box, by associations.*

Association.[1]	Boxes packed.	Direct expense.			Indirect expense.					Total packing house expense.
		Labor.	Packing materials.	Total.	Administrative salaries.	Miscellaneous.	Depreciation.	Interest.	Total.	
Association No. 1:	*Number.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
1921	449,218	17.0	49.7	66.7	2.6	2.0	0.7	1.0	6.2	72.9
Association No. 2:										
1918	167,812	13.8	24.1	37.9	5.0	4.0	2.7	3.6	15.3	53.2
1919	362,258	13.5	28.1	41.6	3.2	2.7	1.2	1.7	8.8	50.4
1920	349,979	14.8	37.7	52.5	3.1	3.7	1.3	1.7	9.8	62.2
1921	427,610	13.6	50.9	64.5	3.0	2.8	1.1	1.4	8.2	72.7
Association No. 3:										
1919	337,846	13.7	24.5	38.1	2.6	4.3	1.2	1.8	9.8	47.9
1920	230,110	14.3	31.4	45.7	4.3	5.6	1.7	2.6	14.2	59.9
1921	418,216	14.0	46.0	60.0	4.3	5.1	1.0	1.4	11.7	71.7
Association No. 4:										
1916	302,419	7.4	18.6	26.0	1.9	1.5	2.8	3.6	9.8	35.8
1917	456,470	7.8	19.1	26.8	1.5	.8	1.9	2.4	6.6	33.4
1918	156,839	9.0	18.5	27.5	2.2	1.2	5.4	7.0	15.9	43.3
1919	381,111	10.2	27.0	37.3	1.7	1.2	2.2	2.9	8.0	45.3
1920	404,938	12.9	32.1	45.0	2.2	1.8	2.1	2.7	8.8	53.8
1921	414,630	12.8	46.2	59.1	3.0	2.5	2.1	2.6	10.2	69.3
Association No. 5:										
1920	237,515	16.3	34.0	50.3	3.7	3.4	2.4	3.4	13.0	63.3
1921	379,632	17.3	49.8	67.1	3.1	3.4	1.5	2.1	10.2	77.3
Association No. 6:										
1916	214,557	9.2	18.3	27.5	2.8	1.6	1.7	2.2	8.4	35.9
1917	363,474	9.9	18.9	28.8	1.9	1.9	1.0	1.3	6.0	34.9
1918	128,622	12.3	19.7	32.0	4.8	4.5	2.9	3.7	16.0	47.9
1919	293,158	11.8	27.4	39.2	2.7	1.7	1.3	1.6	7.2	46.4
1920	264,729	14.5	33.3	47.8	3.3	2.7	1.4	1.8	9.2	57.0
1921	314,925	15.5	46.7	62.2	2.7	2.4	1.2	1.5	7.7	70.0
Association No. 7:										
1920	124,518	17.0	35.5	52.4	6.0	6.8	2.4	3.5	18.7	71.2
1921	215,968	17.9	43.6	61.4	4.5	5.1	1.5	2.1	13.1	74.5
Association No. 8:										
1917	257,211	8.0	18.7	26.8	2.5	1.0	.6	1.2	5.3	32.0
1918	105,601	5.9	19.1	25.1	4.5	2.1	1.1	2.3	10.0	35.1
1919	176,782	9.1	24.7	33.8	3.5	1.9	.6	1.3	7.3	41.1
1920	233,182	11.5	30.1	41.5	3.6	2.8	.5	1.1	7.9	49.5
1921	296,761	12.4	45.3	57.7	3.1	2.2	.4	.7	6.5	64.1
Association No. 9:										
1920	196,049	13.9	33.2	47.0	3.6	4.5	3.1	4.0	15.3	62.3
1921	287,784	13.6	49.1	62.7	3.0	3.4	2.1	2.7	11.2	73.9
Association No. 10:										
1916	140,213	9.5	20.6	30.1	3.0	1.7	1.5	1.4	7.6	37.7
1917	251,926	9.6	20.2	29.8	1.8	1.4	.8	.8	4.8	34.6
1918	132,966	10.9	20.9	31.8	3.4	1.9	1.6	1.5	8.3	40.2
1919	257,127	12.0	26.9	38.9	2.2	2.0	.8	.8	5.8	44.6
1920	262,600	13.2	34.4	47.5	2.4	2.6	.8	.8	6.5	54.0
1921	276,078	16.9	49.7	66.6	3.0	2.9	.8	.7	7.4	74.0

[1] Associations arranged in order of number of boxes packed in 1921.

TABLE 3.—*Detailed statement of orange packing-house expense per box, by associations*—Continued.

Association.	Boxes packed.	Direct expense.			Indirect expense.					Total packing house expense.
		Labor.	Packing materials.	Total.	Administrative salaries.	Miscellaneous.	Depreciation.	Interest.	Total.	
	Number.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Association No. 11:										
1919	282, 318	8. 5	20. 5	29. 0	1. 8	2. 3	. 9	1. 2	6. 2	35. 2
1920	208, 004	12. 9	33. 6	46. 5	3. 3	4. 5	1. 5	1. 9	11. 1	57. 6
1921	242, 882	13. 8	45. 6	59. 4	2. 9	4. 2	1. 2	1. 6	9. 8	69. 2
Association No. 12:										
1919	240, 876	12. 1	28. 0	40. 1	2. 9	2. 6	1. 3	1. 9	8. 6	48. 8
1920	230, 758	12. 9	33. 7	46. 6	3. 5	2. 9	1. 3	2. 0	9. 7	56. 3
1921	241, 092	14. 1	48. 8	62. 9	4. 5	4. 2	1. 3	1. 9	11. 8	74. 7
Association No. 13:										
1916	177, 099	7. 3	19. 7	27. 0	2. 6	1. 2	1. 9	2. 0	7. 6	34. 7
1917	236, 138	7. 7	20. 6	28. 2	2. 0	1. 6	1. 4	1. 5	6. 4	34. 7
1918	64, 794	7. 4	24. 2	31. 6	5. 4	4. 7	5. 2	5. 4	20. 7	52. 2
1919	166, 649	9. 5	26. 8	36. 3	3. 1	2. 4	2. 0	2. 1	9. 6	45. 9
1920	146, 933	9. 9	33. 1	43. 0	4. 1	2. 6	2. 3	2. 4	11. 4	54. 3
1921	239, 663	10. 1	44. 1	54. 2	2. 5	2. 8	1. 4	1. 5	8. 1	62. 4
Association No. 14:										
1916	180, 989	8. 7	20. 1	28. 8	2. 7	2. 7	1. 6	1. 8	8. 7	37. 5
1917	219, 329	9. 2	21. 0	30. 2	3. 9	2. 8	1. 3	1. 5	9. 5	39. 8
1918	86, 270	11. 1	23. 1	34. 1	7. 9	4. 2	3. 3	3. 8	19. 1	53. 2
1919	176, 539	10. 7	28. 7	39. 5	5. 1	6. 8	1. 6	1. 8	15. 4	54. 8
1920	139, 271	14. 5	36. 5	51. 0	7. 4	3. 9	2. 0	2. 3	15. 7	66. 7
1921	168, 592	13. 5	50. 8	64. 3	5. 8	3. 5	1. 7	1. 9	12. 9	77. 2
Association No. 15:										
1919	77, 899	11. 9	27. 0	38. 8	3. 1	2. 7	2. 8	2. 7	11. 4	50. 3
1920	127, 453	13. 8	40. 1	53. 9	3. 4	5. 1	2. 8	2. 7	14. 0	68. 0
1921	158, 733	16. 4	48. 9	65. 3	4. 4	5. 6	2. 4	2. 4	14. 8	80. 1
Association No. 16:										
1917	181, 812	10. 4	19. 6	30. 0	3. 0	. 9	1. 7	1. 8	7. 4	37. 4
1918	54, 548	11. 3	20. 5	31. 8	3. 8	1. 7	5. 5	6. 1	17. 0	48. 8
1919	97, 255	14. 3	25. 5	39. 9	5. 9	1. 9	3. 1	3. 4	14. 2	54. 1
1920	108, 033	14. 9	31. 8	46. 7	6. 4	3. 2	2. 8	3. 1	15. 4	62. 1
1921	151, 709	15. 2	38. 1	53. 4	5. 7	3. 0	2. 0	2. 2	12. 9	66. 2
Association No. 17:										
1917	152, 696	9. 3	19. 9	29. 2	3. 7	1. 4	1. 5	2. 0	8. 6	37. 8
1918	43, 165	10. 3	22. 0	32. 3	11. 5	3. 8	5. 5	7. 0	27. 8	60. 1
1919	134, 088	11. 4	26. 5	38. 0	4. 4	2. 9	1. 8	2. 3	11. 3	49. 3
1920	59, 397	16. 9	31. 4	48. 4	11. 3	2. 5	4. 0	5. 1	22. 9	71. 2
1921	137, 020	15. 2	48. 2	63. 4	5. 2	2. 6	1. 7	2. 2	11. 8	75. 2
Association No. 18:										
1917	163, 133	11. 8	20. 5	32. 3	2. 5	3. 1	. 9	1. 3	7. 7	40. 0
1918	48, 423	13. 9	23. 2	37. 1	8. 5	6. 3	3. 1	4. 3	22. 2	59. 3
1919	146, 184	13. 4	27. 0	40. 4	3. 7	4. 4	1. 0	1. 4	10. 6	51. 0
1920	66, 699	17. 8	37. 4	55. 1	11. 2	5. 1	2. 3	3. 1	21. 6	76. 7
1921	134, 867	17. 0	51. 0	68. 0	7. 1	4. 6	1. 1	1. 5	14. 3	82. 2
Association No. 19:										
1917	183, 386	8. 2	19. 9	28. 1	2. 9	. 7	. 8	1. 1	5. 5	33. 6
1918	40, 116	8. 0	24. 7	32. 7	13. 0	2. 2	3. 8	4. 9	23. 8	56. 6
1919	149, 424	11. 5	29. 1	40. 6	5. 8	1. 0	1. 0	1. 3	9. 0	49. 6
1920	78, 037	14. 8	33. 7	48. 5	12. 2	1. 2	1. 9	2. 5	17. 8	66. 3
1921	126, 525	14. 3	55. 4	69. 7	7. 5	2. 0	1. 2	1. 5	12. 2	81. 9
Association No. 20:										
1920	96, 147	14. 7	34. 6	49. 3	5. 6	2. 0	1. 1	1. 5	10. 2	59. 5
1921	122, 695	15. 4	51. 1	66. 5	5. 6	1. 7	. 9	1. 1	9. 3	75. 8
Association No. 21:										
1918	25, 710	10. 5	21. 6	32. 1	4. 9	2. 2	2. 4	3. 1	12. 5	44. 6
1919	46, 144	11. 4	27. 1	38. 5	6. 5	1. 0	1. 6	2. 0	11. 1	49. 6
1920	39, 473	11. 6	32. 9	44. 4	7. 9	1. 1	1. 7	2. 2	12. 8	57. 3
1921	33, 175	15. 5	49. 8	65. 3	6. 7	1. 4	2. 0	2. 6	12. 7	78. 0
Association No. 22:										
1916	4, 084½	10. 1	24. 0	34. 1	3. 2	4. 1	1. 7	2. 5	11. 5	45. 6
1917	9, 041½	14. 0	21. 2	35. 2	4. 3	6. 6	2. 0	3. 0	15. 8	51. 1
1918	9, 841	15. 1	23. 6	38. 6	4. 1	5. 0	1. 3	2. 1	12. 4	51. 1
1919	17, 549	17. 9	34. 0	51. 9	4. 6	5. 9	1. 2	1. 8	13. 6	65. 4
1920	11, 614	20. 3	33. 4	53. 7	5. 0	5. 3	1. 1	1. 7	13. 0	66. 7
1921	8, 902	22. 4	43. 5	65. 9	5. 6	4. 2	1. 2	1. 8	12. 8	78. 7
Association No. 23:										
1919	2, 936	13. 8	32. 1	46. 0	8. 9	4. 1	1. 7	2. 8	17. 5	63. 4
1920	1, 091	16. 9	38. 1	55. 0	13. 7	5. 9	2. 2	3. 7	25. 5	80. 4
1921	2, 754	24. 2	46. 2	70. 5	14. 2	6. 7	2. 3	3. 9	27. 0	97. 5

TABLE 4.—*Detailed statement of lemon packing-house expense per box, by associations.*

Association.[1]	Boxes packed.	Direct expense.			Indirect expense.					Total packing house expense.
		Labor.	Packing materials.	Total.	Administrative salaries.	Miscellaneous.	Depreciation.	Interest.	Total.	
Association No. 1:	*Number.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents*	*Cents.*	*Cents.*	*Cents.*
1916	228,650	21.3	23.1	44.3	3.3	3.7	1.4	2.4	10.8	55.1
1917	279,175	24.1	23.4	47.5	3.2	4.1	1.5	2.6	11.3	58.8
1918	178,055	29.7	25.3	55.0	4.4	4.7	2.4	4.1	15.5	70.4
1919	339,959	35.0	35.6	70.6	2.7	4.2	1.2	2.1	10.3	80.9
1920	297,143	41.1	38.7	79.7	3.4	6.0	1.4	2.4	13.2	92.9
1921	347,568	40.4	50.4	90.8	3.0	6.4	1.2	2.1	12.7	103.5
Association No. 2:										
1920	164,168	53.8	36.5	90.3	9.7	4.8	4.4	7.8	26.7	117.0
1921	280,075	42.6	56.1	98.7	7.2	6.5	2.6	4.6	20.8	119.5
Association No. 3:										
1917	196,380	24.5	23.4	48.0	5.2	2.0	1.7	3.8	12.6	60.6
1918	69,675	22.4	24.6	46.9	17.6	3.4	4.8	10.6	36.4	83.3
1919	248,299	39.3	29.9	69.1	5.8	3.7	1.4	3.0	13.8	82.9
1920	151,144	46.4	41.3	87.8	9.7	7.1	2.2	4.9	23.9	111.7
1921	231,696	47.0	49.8	96.8	6.4	3.9	1.5	3.2	14.9	111.8
Association No. 4:										
1919	164,957	34.7	33.8	68.6	5.5	4.8	5.0	4.8	20.2	88.7
1920	160,375	44.4	37.8	82.2	5.2	7.8	4.3	4.2	21.4	103.6
1921	175,828	47.1	52.0	99.1	6.7	7.2	3.7	3.6	21.3	120.4
Association No. 5:										
1919	172,665	34.4	32.0	66.5	4.2	5.3	2.1	2.6	14.2	80.7
1920	120,900	43.9	37.1	81.0	5.7	7.9	2.5	3.3	19.3	100.3
1921	167,216	39.9	53.0	92.9	4.5	6.5	1.9	2.4	15.3	108.2
Association No. 6:										
1916	53,789	27.0	22.3	49.3	10.8	5.9	4.5	8.1	29.4	78.6
1917	46,002	35.5	27.3	62.8	13.3	6.1	5.2	9.5	34.2	96.9
1918	87,311	35.5	27.0	62.5	7.4	5.5	2.8	5.0	20.7	83.2
1919	107,931	41.0	33.6	74.6	8.5	4.8	2.2	4.0	19.5	94.0
1920	132,745	61.9	45.0	106.8	7.9	7.0	1.8	3.3	20.0	126.8
1921	157,184	53.4	51.0	104.5	7.1	6.2	1.5	2.8	17.6	122.0
Association No. 7:										
1918	55,486	31.3	28.2	59.5	6.7	3.8	4.4	6.7	21.6	81.1
1919	78,474	33.2	34.0	67.2	5.1	3.2	3.1	4.7	16.1	83.3
1920	101,881	36.0	27.7	63.7	4.6	5.6	2.4	3.6	16.3	80.0
1921	146,433	44.0	51.4	95.4	5.1	4.8	1.7	2.5	14.1	109.5
Association No. 8:										
1917	18,480	29.9	23.6	53.6	5.0	2.1	1.1	2.3	10.5	64.1
1918	19,970	27.6	25.9	53.5	9.6	4.6	2.4	4.9	21.5	75.0
1919	52,398	31.0	27.7	58.7	6.1	3.3	1.1	2.2	12.7	71.4
1920	50,969	34.8	31.8	66.6	5.7	4.4	.9	1.8	12.7	79.3
1921	121,594	29.9	48.2	78.1	4.3	3.0	.5	1.0	8.7	86.9
Association No. 9:										
1920	65,610	39.9	33.8	73.7	8.5	9.6	3.4	4.9	26.3	100.0
1921	88,296	48.0	50.2	98.3	7.2	8.1	2.3	3.4	21.0	119.2
Association No. 10:										
1917	84,853	31.3	26.5	57.8	11.1	8.7	2.9	3.6	26.3	84.1
1918	93,533	33.8	26.9	60.7	8.8	6.6	2.6	3.3	21.2	81.9
1919	49,854	40.8	33.2	74.1	14.5	7.1	4.9	6.2	32.6	106.7
1920	74,293	53.7	38.1	91.8	9.9	7.4	3.3	4.1	24.7	116.5
1921	73,197	48.3	45.4	93.7	9.5	5.7	3.3	4.2	22.8	116.5
Association No. 11:										
1916	45,543	30.0	24.1	54.1	5.0	4.1	2.6	4.0	15.8	69.9
1917	37,667	28.7	22.6	51.3	6.2	7.0	2.9	4.4	20.5	71.8
1918	58,426	30.7	24.8	55.5	5.9	5.2	1.9	3.0	15.9	71.4
1919	65,015	36.6	34.0	70.6	6.3	5.9	1.6	2.5	16.3	86.9
1920	69,083½	41.5	38.3	79.8	7.4	6.0	1.6	2.5	17.6	97.4
1921	65,667	46.5	54.3	100.8	8.6	6.5	1.8	2.7	19.5	120.4
Association No. 12:										
1916	28,435	23.3	22.9	46.2	5.7	2.9	4.5	5.9	19.0	65.2
1917	51,726	25.0	23.5	48.5	4.5	1.8	2.5	3.2	11.9	60.4
1918	23,401	27.0	23.6	50.6	9.1	2.2	5.5	7.1	24.0	74.6
1919	73,966	36.3	30.1	66.4	3.9	2.1	1.7	2.3	10.0	76.5
1920	51,871	41.4	36.5	77.9	6.9	4.3	2.5	3.2	16.9	94.8
1921	55,499	42.3	53.1	95.4	4.9	5.3	2.3	3.0	15.5	110.9
Association No. 13:										
1918	21,438	25.4	29.9	55.3	8.4	3.8	4.1	5.3	21.6	76.9
1919	27,467	33.8	32.9	66.7	11.3	1.7	2.8	3.5	19.3	86.0
1920	32,227	32.2	35.5	67.7	12.0	1.7	2.6	3.3	19.5	87.2
1921	30,026	38.2	52.0	90.3	9.3	1.9	2.8	3.5	17.5	107.8
Association No. 14:										
1919	12,084	35.4	33.9	69.3	13.4	6.2	2.5	4.3	26.3	95.6
1920	16,557	35.8	36.1	71.9	17.9	7.7	2.8	4.8	33.3	105.2
1921	10,318	34.5	51.1	85.6	17.2	8.1	2.8	4.7	32.9	118.5

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[1] Associations arranged in order of number of boxes packed in 1921.

In Tables 3, 4, and 5 there is an apparent discrepancy in some cases between the actual sum of the items and the total shown. For example, labor and material for association No. 7 (Table 3) in 1920 are given as 17 cents and 35.5 cents, respectively, while the total shown is 52.4 cents instead of 52.5 cents. In the preparation of the tables all items were calculated to two or more decimal places. Expressed in two decimals the figures given above are labor 16.97 cents, material 35.45+ cents, total 52.42 cents.

AVERAGE EXPENSE.

The cost of the packing-house operations is readily divided into two main groups: Direct expense, or the material and labor which are used directly in the packing and grading of each box of fruit; and indirect expense, or the general overhead expense which goes on to a large extent with little relation to the amount of fruit being packed. Figure 5 and Table 5 show the average packing-house expense of a group of selected orange and lemon associations from 1917 to 1921. The detailed expense of the associations included in this study is shown in Tables 3 and 4. The average expense shown in Figure 5 was verified by comparison with the records of several associations from which detailed figures were not secured. For that reason it is believed to be a representative average for the period of all associations affiliated in the exchange. Over the 5-year period 1917–1921, inclusive, direct expense on the average made 78 per cent of all packing-house expense for both oranges and lemons. While the proportions between direct and indirect expense were the same for lemons and oranges, direct labor and material per box of lemons cost on the average 70 cents, compared with 43 cents for a box of oranges. Indirect expense was also greater in approximately the same ratio, so that the average of all expense connected with the preparation of a box of lemons for market was 90 cents, while for oranges it was 55 cents.

TABLE 5.—*Average annual packing-house expense (in cents per packed box) of a group of representative orange and lemon associations, 1917–1921.*

Season ending—	Average annual shipments.		Packing material.		Labor.		Indirect expense.		Total packing-house expense.	
	Oranges.	Lemons.	Oranges.	Lemons.	Oranges.	Lemons.	Oranges.	Lemons.	Oranges.	Lemons.
	Boxes.	*Boxes.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
1917	224, 965	102, 040	19. 96	24. 34	9. 62	28. 41	7. 60	18. 19	37. 19	70. 95
1918	81, 900	67, 477	21. 93	26. 24	10. 72	29. 27	16. 99	22. 03	49. 65	77. 53
1919	185, 896	116, 088	27. 27	32. 55	12. 04	35. 97	10. 29	17. 61	49. 61	86. 13
1920	164, 387	105, 998	34. 16	36. 72	14. 55	43. 34	13. 83	20. 84	62. 55	100. 90
1921	228, 236	139, 328	47. 77	51. 29	15. 57	43. 01	11. 43	18. 18	74. 76	112. 48
5-year average	177, 077	106, 186	30. 22	34. 23	12. 5	36. 00	12. 03	19. 37	54. 75	89. 60

Direct expense consists of two items: (1) Packing material, which includes box shook, wraps, labels, strapping, chip board,[3] nails, and miscellaneous supplies, and (2) direct labor, or the labor applicable directly to the actual receiving, packing, grading, or other handling of the fruit. Direct labor does not include the salaries of the manager, foremen, janitor, or night watchmen, or office salaries. These are included in general and administrative salaries.

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[3] Chip board is the name given to the pasteboard placed at the ends and center of the box to prevent injury to the fruit.

The expense of direct labor is much greater for lemons than for oranges, because of the necessity of storing and because the fruit can not be handled to any extent by machinery. Direct labor constitutes 40 per cent of lemon packing-house expense and only 23 per cent of orange packing-house expense. The greater amount of labor required to prepare lemons for market is even more strikingly indicated if the costs per packed box of oranges and lemons are compared—36 cents per box for lemons and 12½ cents for oranges.

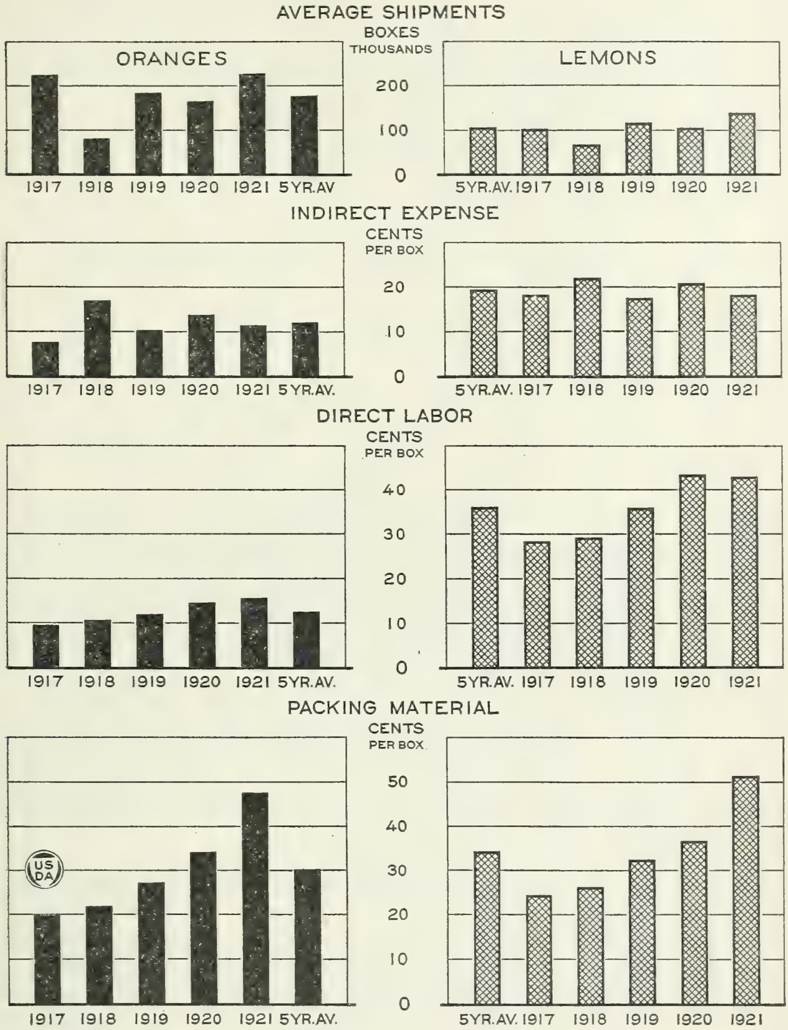

FIG. 5.—Average annual shipments and packing-house expense (in cents per packed box) of a selected group of orange and lemon associations for the 5-year period 1917–1921

Indirect expense is proportionately the same for the two kinds of fruit, 22 per cent, but is greater per box for lemons. The lemon houses studied required a larger investment per box packed than orange houses, although the average investment of the latter in equipment is greater. The average investment in fixed assets of the lemon houses studied was $10,000 for land, $64,000 for buildings, and $18,000 for equipment, compared with an investment of $7,000 for land, $33,000 for building, and $24,000 for equipment for the orange houses. The greater investment in these assets means that charges for depreciation and interest are greater for the lemon houses.

To show comparatively the cost of carrying investments in buildings and equipment, interest on the fixed investment computed at the going rate for farm mortgages in California—7 per cent—has been included as one of the overhead costs in this study. Depreciation is computed uniformly for all associations at 10 per cent per annum on equipment and 3 per cent on buildings. The charges for depreciation made on the books of the associations were far from uniform. Even in the same association the charge varied in accordance with the conservatism of the management at a given time. A common charge for depreciation was 2 cents per box.

Labor used in packing a box of lemons costs on the average nearly three times as much as labor used in packing a box of oranges. Table 6 indicates that the increased costs are incurred in the operations of receiving, washing, storing, grading, and packing the fruit. These operations cost from two to nine times as much for lemons as for oranges, because hand labor must be employed instead of the elaborate equipment possible in an orange house. The other operations—box making and labeling, pressing and strapping, loading, and general labor—are about the same for a box of either fruit. Packing is almost three times as expensive as any other operation in an orange house, constituting nearly half of direct labor and amounting to 5.5 cents a box. Packing lemons averages 11.2 cents, but is exceeded by the expense of grading.

Box shook amounts to nearly three-quarters of the total expense for packing material. The tissue paper which is wrapped around the individual fruits makes up all but 6 or 7 per cent of the remainder. Nails, strapping, labels, chip board, paste, and miscellaneous supplies together amount to 2 or 3 cents a box.

Salaries of the administrative officers and office force are the most important indirect expense, amounting to 4.6 cents per box of oranges and 7.6 cents per box of lemons.

Miscellaneous expense is made up of the residual expense items, which are handled in different ways by the various associations. Expense for repairs and maintenance, and for light, power, and water is greater per box for oranges than for lemons, because of the greater amount of machinery in an orange-packing house. Charges for taxes and insurance seem to be heavier in the average lemon house.

TABLE 6.—*Analysis of average packing-house expense of representative orange and lemon associations for the five-year period, 1917–1921.*

Item.	Cents per packed box.	
	Oranges.	Lemons.
Total packing material	30. 2	34. 2
Box shook	22. 35	23. 60
Wraps	6. 04	7. 87
Nails	. 60	1. 03
Labels	. 30	. 34
Strapping	. 30	. 34
Chip board	. 30	. 34
Miscellaneous	. 30	. 68
Total direct labor	12. 5	36. 0
Packing	5. 5	11. 2
Grading and tallying	2. 1	13. 0
Receiving, washing, and storing	. 9	7. 9
Box making and labeling	. 9	1. 0
Pressing and strapping	1. 1	1. 1
Car loading	. 7	. 7
General labor	1. 3	1. 1
Total indirect expense	12. 0	19. 4
General and administrative salaries	4. 65	7. 64
Miscellaneous expense	3. 05	5. 05
Depreciation	1. 89	2. 63
Interest	2. 42	4. 05
Total packing-house expense	54. 7	89. 6

INCREASES IN EXPENSE.

The cost of direct labor per box increased rapidly from 1916 to 1920, but declined slightly in 1921. Before 1916 this expense had been relatively stationary for the previous 15 years, except for a slight advance in 1913 due to the fact that the crop had been frozen and more labor was required to prepare it for market. The cost of packing material increased slightly faster than labor costs and reached the peak early in the 1921 season. When expressed on a per-box basis, the various components of indirect expense in a given association vary inversely to the number of boxes packed.

Total packing expense per box is the sum of direct expense, which increased steadily during the 5-year period, and indirect expense, which varied inversely to the size of the crop. Direct expense, however, amounts to four-fifths of the total packing expense, which therefore shows a fairly steady advance. In 1919 the total packing expense for oranges remained stationary in spite of a slight increase in the cost of labor and material, because indirect expense was reduced by the large crop of that year.

Figure 6 and Table 7 show the cost per box of direct labor and material and the indirect expense of one lemon association over a period of 21 years. The rapid increase in material and labor expense are brought out clearly. The increase in indirect expense during 1913 and 1914 can be traced directly to the short crop during those years.

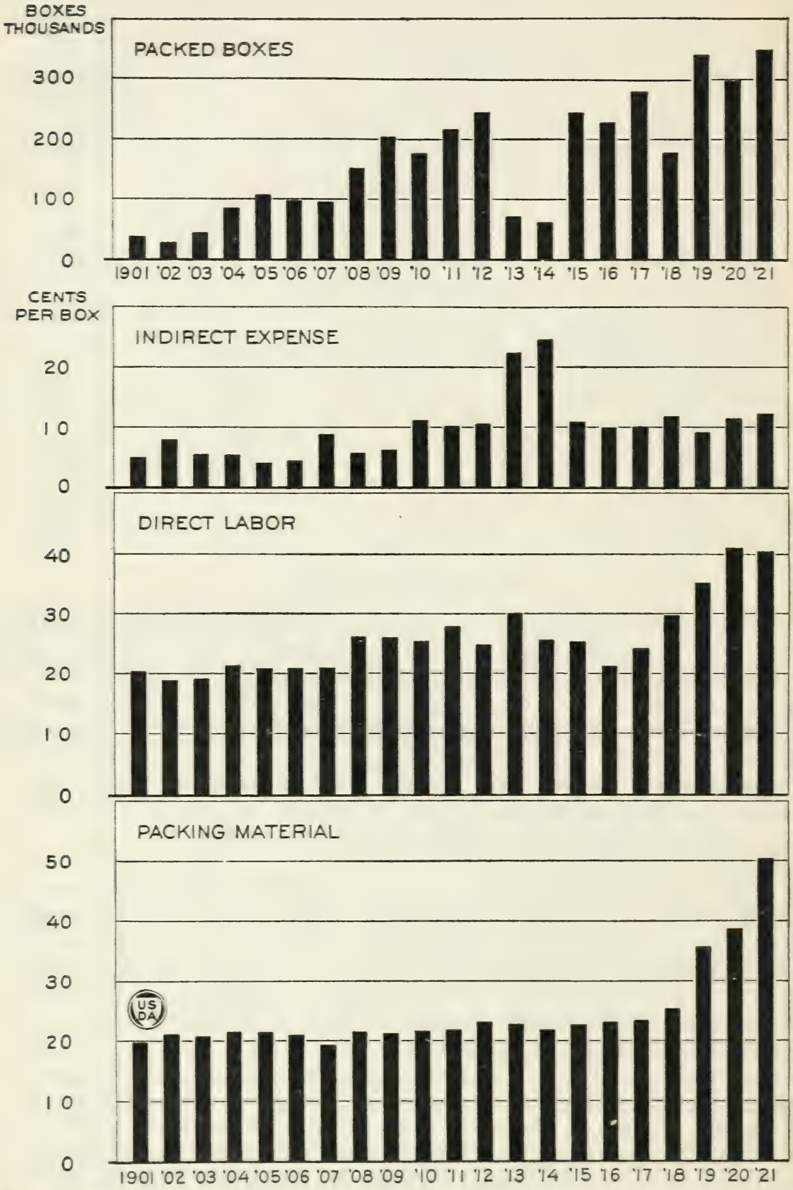

FIG. 6.—Annual shipments and packing-house expense (in cents per packed box) of one lemon association for 21 years, 1901–1921

TABLE 7.—*Annual shipments and packing-house expense (in cents per packed box) of one lemon association for 21 years (1901–1921).*

Season ending—	Packed boxes.	Packing material.	Direct labor.	Indirect expense.	Total packing expense.
Year.	*Number.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
1901	35, 545	19. 85	20. 31	4. 98	45. 14
1902	23, 704	21. 00	18. 67	7. 63	47. 30
1903	43, 009	20. 65	19. 03	5. 36	45. 04
1904	83, 445	21. 38	21. 26	5. 09	47. 73
1905	107, 623	21. 25	20. 89	3. 90	46. 04
1906	98, 076	20. 95	20. 79	4. 33	46. 07
1907	94, 496	19. 24	20. 88	8. 81	48. 93
1908	150, 719	21. 49	26. 13	5. 62	53. 24
1909	204, 716	21. 20	25. 98	6. 12	53. 30
1910	176, 587	21. 59	25. 39	11. 03	58. 01
1911	216, 522	21. 79	27. 93	10. 04	59. 76
1912	244, 238	23. 07	24. 66	10. 44	58. 17
1913	70, 168	22. 77	30. 03	22. 39	75. 19
1914	61, 430	21. 87	25. 53	24. 45	71. 85
1915	244, 432	22. 69	25. 32	10. 88	58. 89
1916	228, 650	23. 09	21. 25	9. 92	54. 26
1917	279, 175	23. 42	24. 08	10. 00	57. 50
1918	178, 055	25. 27	29. 70	11. 65	66. 62
1919	339, 959	35. 56	35. 04	9. 06	79. 66
1920	297, 143	38. 67	41. 05	11. 43	91. 15
1921	347, 568	50. 36	40. 42	12. 11	102. 89

In this table depreciation and interest are included as charged on the books of the association. Consequently, there are slight differences between the figures for indirect expense shown here and those given in Table 4.

VARIATIONS IN EXPENSE.

In the preceding discussion, packing-house expense is described in terms of averages, because it is possible in this way to compare different factors entering into expense, or different periods. Wide differences may exist, however, between a given association and the average. In the analysis of these differences some insight is gained into the operating efficiency of different units, and methods of improving their effectiveness are suggested. It is not practicable within the limits of the present investigation to make a thorough analysis of this subject. To do so would require several months of additional study in the packing houses of southern California, with the aid of standardized records that are not now generally kept. This discussion deals with the more striking variations in expense and some of the more evident causes of these differences.

An examination of Table 5 and Figure 5 will show that packing-house expense is made up largely of expense for labor and material. As shown in Figure 7 and Table 8, there are average differences in the cost of material between associations for the three-year period shown of almost 7 cents per box. A part of this difference is due to the purchase of box shook made from various kinds of wood with corresponding differences in price; a part may be due to purchases of material from other sources than the supply company; a part to the economy and efficiency with which material is used, and varying degrees of deterioration in material stored from one season to the next; and a part of the difference may be due to inaccuracies in inventory.

The reduction of the expense of material by the associations consists largely in the prevention of waste. Every experienced association manager realizes this, but the problem is worthy of detailed study by the proper agency. Paper wraps, which make up approximately 21 per cent of the value of the packing-house supplies pur-

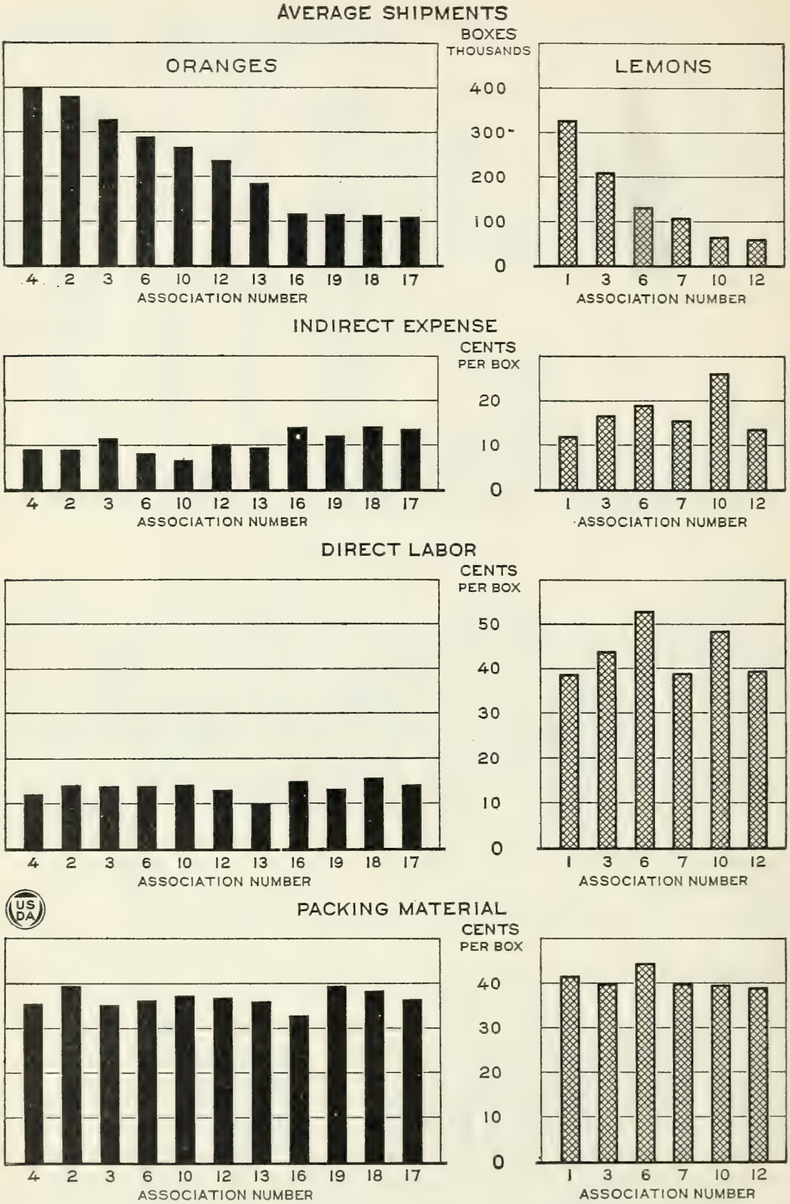

FIG. 7.—Average annual shipments and packing house expense (in cents per packed box) of 11 associations handling oranges only and 6 associations handling lemons only for the 3-year period, 1919–1921. The association numbers refer to associations represented in Tables 3 and 4.

chased through the Fruit Growers Supply Co., may be wasted in large quantities under careless management. A certain amount of unnecessary waste of box shook is also likely to occur unless close supervision is maintained.

TABLE 8.—*Average annual shipments and average packing-house expense (in cents per packed box), of 11 associations handling oranges only, and 6 associations handling lemons only, for the three-year period, 1919–1921.*

[Association numbers refer to Table 3 for oranges and to Table 4 for lemons.]

Association No.	Average boxes packed.	Material.	Labor.	Indirect expense.	Total packing expense.
	Number.	*Cents.*	*Cents.*	*Cents.*	*Cents.*
Oranges:					
4	400, 226	35. 4	12. 0	9. 0	56. 4
2	379, 949	39. 6	14. 0	8. 9	62. 4
3	328, 724	35. 2	13. 9	11. 6	60. 8
6	290, 937	36. 2	13. 9	8. 0	58. 1
10	265, 268	37. 3	14. 1	6. 6	57. 9
12	437, 575	36. 9	13. 0	10. 1	56. 0
13	184, 415	36. 0	9. 9	9. 4	55. 3
16	118, 999	32. 8	14. 9	14. 0	61. 7
19	117, 995	39. 5	13. 2	12. 1	64. 8
18	115, 917	38. 3	15. 6	14. 1	68. 0
17	110, 168	36. 4	14. 0	13. 6	64. 0
Lemons:					
1	328, 223	41. 7	38. 8	12. 0	92. 5
3	210, 380	39. 9	43. 8	16. 6	100. 4
6	132, 620	44. 3	52. 9	18. 9	116. 0
7	108, 929	39. 8	38. 9	15. 3	94. 0
10	65, 781	39. 6	48. 4	26. 0	114. 0
12	60, 445	39. 0	39. 6	13. 7	92. 2

Differences in the expense for labor are more striking and more dependent upon managerial efficiency. In general, labor costs in the fruit-packing industry depend upon: (1) The wage scale, (2) the experience and efficiency of the workman, (3) supervision, (4) the kind or quality of fruit handled, and (5) the layout of the packing plant and the use made of labor-saving machinery. The wage scale is fixed by competitive conditions, and in general is not susceptible to the control of the association managers. The problem of securing experienced packing-house labor is one that affects associations in remote districts more seriously than those near centers of population. This, however, is a fixed condition, and one which a manager can change only by offering special inducements to experienced help. Whether it is posssible to secure a full quota of experienced help or whether inexperienced workers must be trained will influence labor costs to some degree.

The third factor, supervision, is one of the most important in maintaining a low labor expense. This means seeing that each employee is given work for which he is best adapted and is performing the task to which he is assigned; and it means planning the work in such a way that there is no lost motion and that time is not lost by one department being obliged to wait for another for long periods. No hard and fast rules can be laid down for securing the effective supervision of labor. The results obtained will depend primarily upon the ability and personality of the manager and foreman.

The nature and quality of the fruit handled affects labor costs materially; but aside from making special provision to handle off-grade or frost-damaged fruit, such conditions must be accepted as causing a necessary additional expense. The plan of the packing house and the equipment used affect the efficiency with which labor can be employed, and may materially influence labor expense.

Satisfactory, well-arranged equipment and a well-planned plant do not necessarily mean an excessive investment. Many small associations are well above the average in this respect. More attention has been given to planning the packing house and the layout of equipment in recent years than formerly.

Reference to Table 6 will show the relative importance of the various labor operations. Packing oranges cost, on the average, 5.5 cents per box for the period 1917–1921. This is piecework, for the most part, and the cost is not so susceptible to control by the management as are other operations. All other packing-house labor for oranges cost, as an average of the associations studied, 7 cents per box for the seasons ending 1917 to 1921, inclusive. The largest item is "grading and tallying," which cost 2.1 cents per box. It is in these miscellaneous operations that savings in labor costs can generally be made.

Labor employed in packing lemons, as an average of the associations studied for the 5-year period, cost 11.2 cents, and all packing-house labor 36 cents per box. In the operations usually performed by day labor, there are two large items, "receiving, washing, and storing," 7.9 cents per box, and "grading and tallying," 13 cents per box. The total cost of the operations, usually performed by day labor, excluding car loading and packing, is 24.1 cents per box. As might be expected, labor costs of the lemon associations show wider variations than those of associations handling oranges.

Table 8 shows the variation in labor costs of associations handling lemons only and those handling oranges only. The variations in the houses handling both oranges and lemons are similar for each kind of fruit, but costs in the "mixed" houses can not be compared so definitely with the total volume of business and for that reason they have been omitted from the chart (fig. 7.) The chart shows clearly that labor economy is not correlated with volume of business. Orange association No. 13 maintained an average labor cost of a little less than 10 cents per box as an average for the three years; it cost four associations (Nos. 2, 3, 6, and 10), handling a greater volume of business, approximately 14 cents per box for packing-house labor, as an average for the same period, or 4 cents more than association No. 13.

The data at hand do not explain the reason for the lower labor costs of association No. 13. However, if association No. 2, for example, could have obtained the same labor economy, it would have returned to its members over $15,500 additional each year, for the three years represented, or the four associations mentioned would have made a total annual saving of over $50,000.

The labor costs of lemon houses show even greater opportunity for economy. The smallest association represented, No. 12, shows an average cost for packing-house labor of 39.6 cents per box for the three-year period. It costs association No. 6, 13.3 cents per box more, or 52.9 cents per box, as an average for the same period. If this association could have reduced labor expense to the same level as No. 12, its annual saving would have been over $17,600 for the three-year period.

Since the local units of the exchange operate over 200 packing houses, even a fractional part of the savings indicated would be an important item. A further study and analysis of labor costs and operations by the proper agency would seem to be justified.

Low labor costs may be secured at the expense of real efficiency as it is reflected in the net returns received by the members of the association. At the same time, there is every indication that low labor costs are secured, as a general rule, by efficient management and only exceptionally at the expense of careful handling, grading, and packing of the fruit.

Although labor and material make up, on the average, 78 per cent of the total packing-house expense, there are instances in which indirect expense raises the total above the average, or savings in this item materially reduce the total expense. Indirect expense, which is subdivided in Tables 3 and 4 into "administrative salaries," "miscellaneous expense," "depreciation," and "interest," indicates inverse correlation with the volume of business handled.

Administrative salaries, expressed on a per-box basis, are considerably higher for the smaller than for the larger associations. At a point about 30 per cent above the average size of the associations studied, as represented by average shipments for the five-year period (Table 5), there appears to be little saved in the per-box cost of administrative salaries by an increase in size. Other items of indirect expenses are not correlated so closely with the volume of business handled. Miscellaneous expense, depreciation, and interest may be as large an item per box in an association handling a large volume of business as in one whose annual shipments are less than one-fourth as great.

However, in another sense all items of indirect expense are directly dependent upon volume of business. If shipments are reduced for any reason, as in 1917–18 by heat damage, the effect of the reduced output is to increase the overhead expense per box. Tables 3 and 4 show that indirect expense in 1918 was, in many instances, from two to three times as much per box as in 1917 and 1919. This is also shown in Table 7 and Figure 6, where it will be seen that reduced shipments in 1913 and 1914 more than double indirect expense per box. Miscellaneous expense appears to be less affected than other items by a temporary reduction in volume of business.

The lemon associations represented in Figure 7 show variations in indirect expense for the three-year period, 1919–1921, of 14 cents per box. In these particular cases the increase is definitely the result of high administrative salaries and miscellaneous expense, as will be seen by reference to Table 4. Comparing associations No. 1 and No. 12, which show low indirect expense, it will be seen, by reference to Table 4, that, although the expense per box of the smaller association for salaries is greater, it is able to offset this partially by a smaller item of miscellaneous expense, and that depreciation and interest are also maintained at a low figure. A comparison of the orange associations represented in Figure 7 and Table 6 shows differences of over 7 cents per box in this item.

Indirect expense may be unduly high during a given year, when a large packing plant has been built to care for the fruit of young orchards not yet in bearing. This is a condition that will be corrected in time. Reference to Tables 3 and 4, however, will show items of interest and depreciation, in 1920, for example, totaling over 12 cents per box, and others which total only 1½ cents per box. Without attempting to assign reasons for these differences, it is apparent that a careful study of the relation of investments of the associations in buildings and equipment to volume and costs would be of value. This subject must be considered in connection with the item of labor expense. The capacity of a packing plant must be sufficient to care for the maximum number of boxes that will be received during any season; otherwise the fruit will not be handled, graded, or packed with sufficient care, and labor expense will be increased.

After allowance is made for factors of expense beyond the control of the management, it is still evident that there are a number of associations that operate more economically than others, without disregarding the proper handling of the fruit. An industry which during the past five years has been obliged to face constantly increasing costs can hardly afford to disregard any opportunities to reduce expense.

GROWERS' RECEIPTS.

Figure 8 shows the average returns per box, f.o.b. packing house, for navel oranges, Valencia oranges, grapefruit, and lemons shipped from 1910 to 1922, inclusive. The diagram is based on the average returns for all exchange shipments. The average packing-house expense must be deducted from the prices shown in order to arrive at a figure which indicates the growers' receipts. Out of this net amount the grower must pay the expense of harvesting and hauling the fruit and all production costs.

Table 9 presents the lowest and highest receipts disbursed by the orange and lemon associations studied during each of the seasons ending 1917 to 1921, inclusive, and also the average receipts to the growers for each year.

TABLE 9.—*Comparison of growers' net fruit receipts (in dollars per packed box), with total packing-house expense of a group of representative orange and lemon associations.*

	Net receipts to growers.			Packing-house expense.		
	Low.	High.	Average.	Low.	High.	Average.
	Dollars.	*Dollars.*	*Dollars.*	*Cents.*	*Cents.*	*Cents.*
1917:						
Oranges	1.34	2.12	1.58	32.0	51.1	37.2
Lemons	2.27	3.29	2.58	58.8	96.9	71.0
1918:						
Oranges	2.54	5.60	3.87	35.1	60.1	49.7
Lemons	3.85	4.76	4.26	70.4	83.3	77.5
1919:						
Oranges	2.27	3.70	3.06	35.2	65.4	49.6
Lemons	2.38	3.86	2.79	71.4	106.7	86.1
1920:						
Oranges	2.21	4.37	3.32	49.5	80.4	62.6
Lemons	.86	2.19	1.73	79.3	126.8	100.9
1921:						
Oranges	.89	2.82	1.92	62.4	97.5	74.8
Lemons	2.10	3.21	2.67	86.9	122.0	112.5

The first impression gained from Table 9 is that variations in receipts are much greater than the variations in packing-house expense. It would appear at first glance that packing-house expense is a relatively unimportant item, and that the attention of the association should be directed to increasing the selling price of their ship-

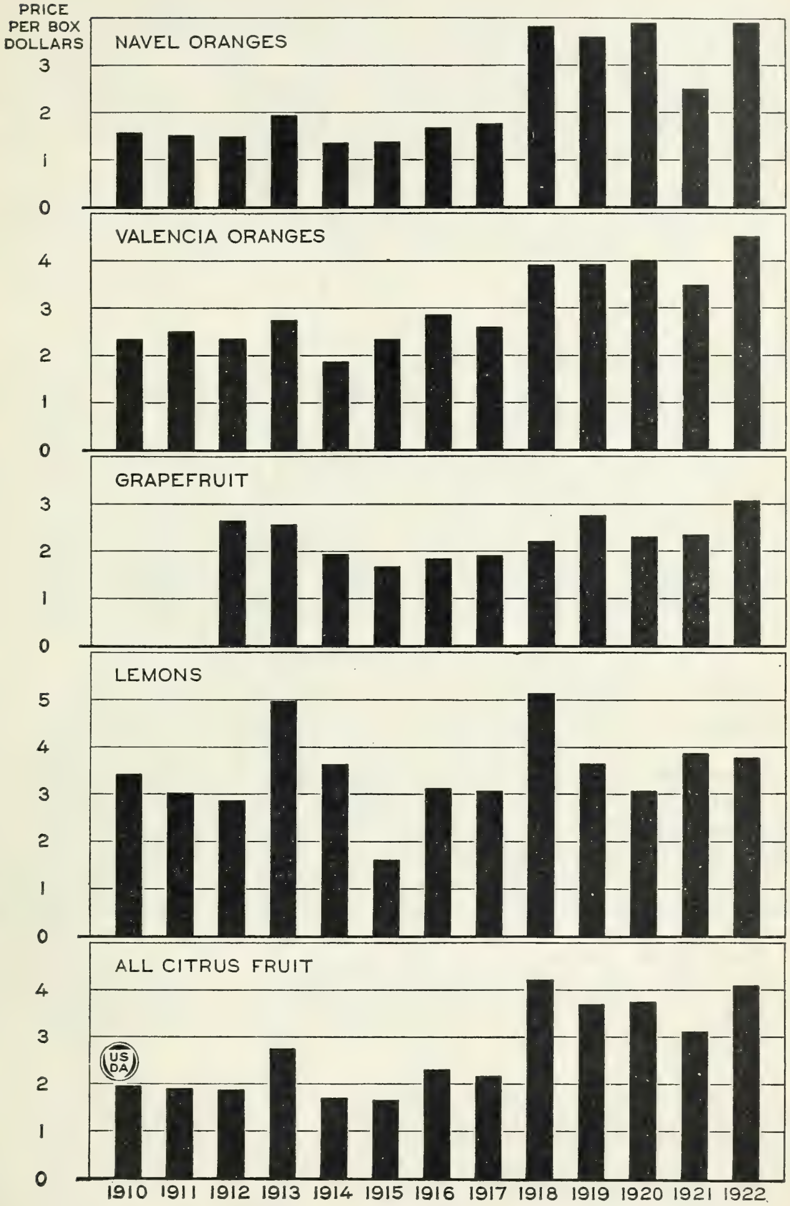

FIG. 8.—Average price per box, f. o. b. packing house, of all shipments through the California Fruit Growers Exchange, 1910–1922

ments. Within reasonable limits this is true, although it does not follow that the sale price of citrus fruit can be increased by increasing the cost of the packing-house operations, or that it is necessary to increase the cost of these operations to secure better grading, or packing, or more careful handling of the fruit. There are many factors that determine the price at which a shipment of citrus fruit sells. Although the grade and character of the pack are important, variety, quality, and market conditions are no less so, and these factors are not under the control of the association management.

Economy in packing-house operation made at the expense of the merchantable quality of the fruit may result in losses several times greater than the amount saved. Packing-house expense, over the 5-year period, averaged one-sixth of the sale price of oranges, and less than one-fourth of the sale price of lemons. In other words, a change of 16⅔ per cent in the price received for oranges by an average association would influence the growers' receipts as much as a change of 100 per cent in total packing-house costs. A similar change of 25 per cent in lemon prices would affect the growers' receipts as much as a change of 100 per cent in lemon packing-house costs.

However, this does not minimize the importance of reducing packing-house expense. It will be noted that in 1920 and 1921, packing-house expense tended to become more nearly equal to the growers' receipts. In 1921 the lowest average growers' receipts for oranges are a little less than the highest packing-house expense. Packing-house expense, therefore, is becoming an increasingly important item and its relation to the growers' receipts a matter for careful consideration.

EXPENSE OF DISTRIBUTION.

The local associations affiliated with the California Fruit Growers Exchange, harvest, grade, and pack the fruit, and load it in refrigerator cars. The fruit is sold by the district exchanges through the facilities provided by the central exchange. The central exchange maintains an orange and lemon sales office in Los Angeles, and agents in all important markets. At the present time there are six division offices and 54 district offices which are under the direction of men on the pay roll of the exchange. In addition, the exchange is represented by eight brokers with whom it has direct contacts, and also by a number of brokers in smaller markets who operate under the direction of the nearest district or division manager. Although the district exchange managers do not deal directly with the market agents of the exchange, they direct, after consultation with the sales managers of the exchange, the place and time of sale and the price of shipments from their district.

Proceeds from the sale of shipments are remitted by the market representative, through the central office, to the district exchange (or direct contract shipper). The district exchange manager retains an amount from the proceeds of each sale sufficient to pay the expense of the central organization and his own exchange. He also deducts an authorized amount per box to purchase stock of the Fruit Growers Supply Co., or the by-products companies, and remits the balance of the receipts to the association making the shipment. If the marketing "retain" is in excess of the amount necessary for the expense of the district and central exchanges, the surplus is refunded to the associations at the end of the fiscal year.

DISTRICT EXCHANGE EXPENSE.

Since the district exchanges employ the facilities of the central exchange, their operating expense is not great. A small amount of office equipment and $1,000 to $2,000 to meet current needs are all the capital they require. Salaries make up nearly three-fourths of the total expense, and the other items are such as would be incurred in the operation of most offices. Telephone expense is more important, because it is necessary to keep in communication with the associations and the central exchange.

The total expense of the district exchanges averaged slightly over 1 cent per box for the past few years, although a few districts operate for as little as one-half cent per box, and the expense of a few is over 2 cents per box.

EXPENSE OF THE CENTRAL EXCHANGE.

The cost of maintaining the facilities of the central exchange is necessarily considerably greater than the district exchange expense. The selling expense of the exchange includes the maintenance of two sales departments in Los Angeles and approximately 60 salaried offices located in various markets. In the aggregate, salaries and other expense connected with the maintenance of these offices is a large sum, ranging during the last 10 years from more than $300,000 to over $700,000 for a 12 months' period. Included in this total is the item of telegraph and telephone expense, which totals approximately $100,000 for each 12 months. Computed on a per-box basis, however, the selling expense of the exchange has been maintained at a remarkably low figure, as will be seen by reference to Table 10. The cost of the central exchange sales service has varied from a little over 3 cents per box to slightly over 5 cents per box during the last 10 years.

In addition to its sales force, the exchange maintains a general and administrative office, a service and regulatory section, largely under the field department, and spends considerable sums in advertising. Advertising expense has increased from $45,625 in 1913 to $855,798 in 1921 and a little over $530,000 for the short-crop year of 1922. The total expense of the central exchange, including advertising, has therefore varied during the past 10 years from 5.7 cents per box in 1914 to 10.8 cents per box for the 1922 season.

TABLE 10.—*Net expense of the California Fruit Growers Exchange, in cents per box, all shipments.*

Season ending—	General and administrative.	Service and regulatory.	Selling.	Advertising.	Total.
1913	1.4		5.3	0.7	7.4
1914	.7		3.5	1.5	5.7
1915	.9		3.5	1.8	6.2
1916	1.02	0.01	3.72	2.51	7.3
1917	.9	.1	3.1	2.5	6.6
1918	1.0	.1	4.4	2.2	7.7
1919	.8	.2	3.4	2.7	7.1
1920	1.0	.3	4.2	3.3	8.8
1921	1.3	.5	4.1	3.7	9.6
1922	1.2	.7	5.1	3.8	10.8

EXPENSE OF TRANSPORTATION.

The steady advance of transportation expense from 1917 to 1921 and the small decline taking place in 1922 are shown in Figure 9. Transportation expense per box is corrected for distribution to different tariff territories, and adjusted for varying box weights and varying numbers of boxes per car. Since shipments are made under ventilation or under various types of refrigeration, the expense per box for refrigeration is the average expense of all shipments of the exchange during the season, and not the average of shipments made under refrigeration.

Freight makes up approximately 85 per cent of the total transportation expense for oranges and approximately 91 per cent of the lemon transportation expense. Refrigeration charges constitute the chief part of the remainder of the expense. Miscellaneous expense, such as heater charge, track storage, and demurrage, are relatively insignificant items.

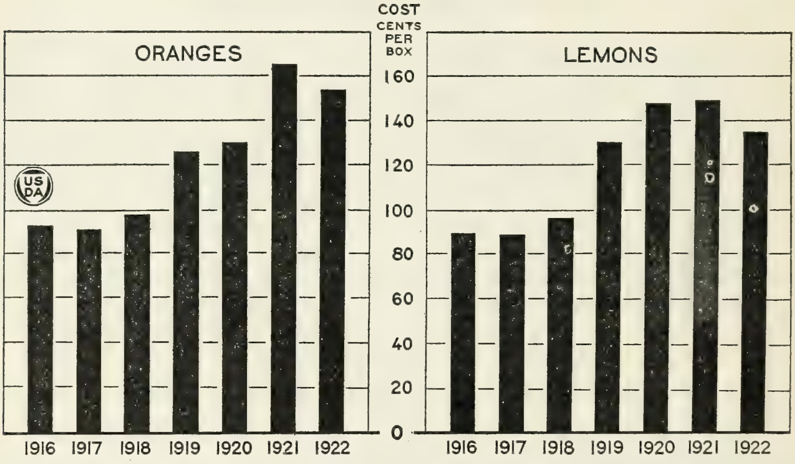

FIG. 9.—Average annual transportation expense (in cents per packed box) of citrus shipments from California to consuming centers

Through the winter months oranges are generally shipped in ventilated refrigerator cars. Under these conditions no charge is made for refrigeration. Lemons are shipped almost entirely under ventilation. Refrigeration is used only for "tree-ripe" lemons, or lemons that for any other reason do not have good carrying qualities.

As the season advances it is necessary to refrigerate all orange shipments. The cost of shipping citrus fruit under standard refrigeration to eastern markets is approximately 20 cents per box. A car is re-iced at every icing station while it is en route to market, or every 24 hours on the average. During warm weather at least half the ice is used to reduce the initial temperature of the shipment, and as the construction of the car and the nature of an orange load are not adapted to the free circulation of air, four to five days are generally required for the shipment to reach the minimum temperature at which it can be held throughout the trip.

Many associations have constructed precooling plants in which the fruit is cooled to a uniformly low temperature prior to shipment. As a general rule, these precooling plants are equipped to manufacture ice and the precooled shipments are forwarded with one icing only. A shipment that has been precooled before it is loaded in a refrigerator car will melt much less ice while it is in transit to market, and it has been found that ordinarily a precooled shipment with one icing will arrive in as satisfactory condition as a nonprecooled shipment under standard refrigeration.

Precooling enables the shippers to obtain refrigeration at a lower cost, and, theoretically at least, provides conditions more favorable to the preservation of the fruit in that the temperature of the shipment is reduced more rapidly. A brief study of the precooling plants of five associations indicates that it usually costs from 10 to 16 cents per box to precool and pre-ice oranges or lemons, exclusive of a car-rental charge amounting to a little over 1 cent per box made by the railroads. A wide variation exists between associations on account of differences in equipment and in operation, and for that reason only the most general statements can be made.

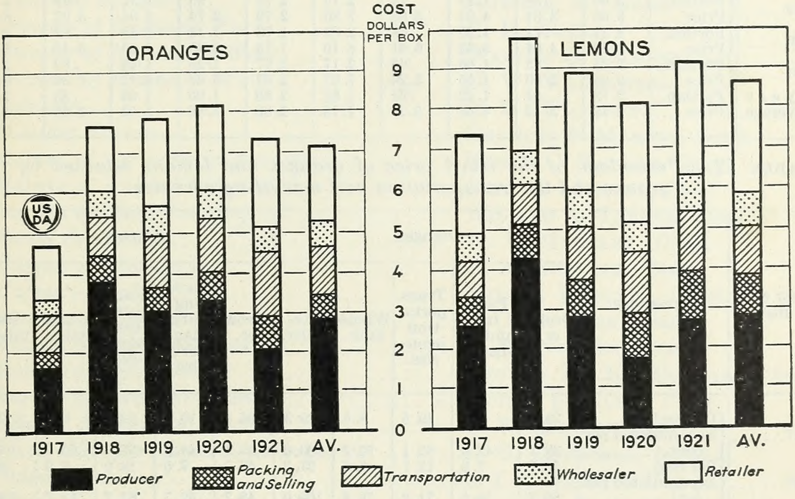

FIG. 10.—Portion of retail price of oranges and lemons received by each agency and price at each stage of marketing

WHOLESALE AND RETAIL MARGINS.

Oranges and lemons are sold through the fruit auctions to jobbers and retailers, or by private sale to car-lot wholesalers who resell the fruit to smaller jobbers or directly to retail merchants. There are other avenues for the sale of citrus fruit, but these channels are in most general use. As will be seen from Figure 10 and Tables 11 and 12, the margin per box received by the wholesaler is only slightly less, than the entire expense of the local association, the district exchange, and the central exchange. The wholesalers' average margin for the five-year period 1917-1921 was 61 cents per box for oranges and 83 cents for lemons.

TABLE 11.—*Portion of retail price of oranges and lemons received by each agency and the price at each stage of the marketing process.*

Year ending—	Portion retained by each agency and price at each stage.	Oranges.					Lemons.				
		Grower.	Packing and exchange service.	Transportation agencies.	Wholesaler.	Retailer.	Grower.	Packing and exchange service.	Transportation agencies.	Wholesaler.	Retailer.
1917	Portion	$1.58	$0.44	$0.92	$0.41	$1.39	$2.58	$0.79	$0.88	$0.64	$2.46
	Price	1.58	2.02	2.94	3.35	4.74	2.58	3.37	4.25	4.89	7.35
1918	Portion	3.87	.59	.97	.58	1.62	4.26	.88	.97	.88	2.76
	Price	3.87	4.46	5.43	6.01	7.63	4.26	5.14	6.11	6.99	9.75
1919	Portion	3.06	.58	1.27	.74	2.15	2.79	.95	1.31	.92	2.91
	Price	3.06	3.64	4.91	5.65	7.80	2.79	3.74	5.05	5.97	8.88
1920	Portion	3.32	.72	1.29	.68	2.09	1.73	1.12	1.48	.82	2.95
	Price	3.32	4.04	5.33	6.01	8.10	1.73	2.85	4.33	5.15	8.10
1921	Portion	2.05	.85	1.66	.64	2.17	2.67	1.25	1.49	.89	2.81
	Price	2.05	2.90	4.56	5.20	7.37	2.67	3.92	5.41	6.30	9.11
5-year average	Portion	2.78	.64	1.22	.61	1.88	2.80	1.00	1.23	.83	2.78
	Price	2.78	3.42	4.64	5.25	7.13	2.80	3.80	5.03	5.86	8.64

TABLE 12.—*Percentage of the retail price of oranges and lemons retained by the grower and the transportation and marketing agencies.*

Year ending—	Percentage.	Oranges.					Lemons.				
		Grower.	Packing and exchange.	Transportation agencies.	Wholesaler.	Retailer.	Grower.	Packing and exchange service.	Transportation agencies.	Wholesaler.	Retailer.
1917	Per cent	33.3	9.3	19.5	8.6	29.3	35.1	10.7	12.0	8.7	33.5
	Accumulated per cent	33.3	42.6	62.1	70.7	100.0	35.1	45.8	57.8	66.5	100.0
1918	Per cent	50.7	7.8	12.7	7.6	21.2	43.7	9.0	10.0	9.0	28.3
	Accumulated per cent	50.7	58.5	71.2	78.8	100.0	43.7	52.7	62.7	71.7	100.0
1919	Per cent	39.2	7.4	16.3	9.5	27.6	31.4	10.7	14.8	10.4	32.7
	Accumulated per cent	39.2	46.6	62.9	72.4	100.0	31.4	42.1	56.9	67.3	100.0
1920	Per cent	41.0	8.9	15.9	8.4	25.8	21.4	13.8	18.3	10.1	36.4
	Accumulated per cent	41.0	49.9	65.8	74.2	100.0	21.4	35.2	53.5	63.6	100.0
1921	Per cent	27.8	11.6	22.5	8.7	29.4	29.3	13.7	16.4	9.8	30.8
	Accumulated per cent	27.8	39.4	61.9	70.6	100.0	29.3	43.0	59.4	69.2	100.0
5-year average	Per cent	39.0	9.0	17.1	8.5	26.4	32.4	11.6	14.2	9.6	32.2
	Accumulated per cent	39.0	48.0	65.1	73.6	100.0	32.4	44.0	58.2	67.8	100.0

The retailers' margin is considerably greater than that of the wholesaler. For oranges it has averaged $1.88 per box for the five-year period 1917–1921 and $2.78 per box for lemons for the same period, according to data collected by the exchange. In other words, the retailer during this period received an amount equal to 67.6 per cent of the grower's net receipts for each box of oranges which he handled, and only 2 cents less than the grower as a margin for each box of lemons handled during the same period. During 1920, according to these data, the retailer of lemons received as a margin $1.22 per box more than the grower received for the fruit.

As an average for the five-year period, 52 per cent of the total price paid for oranges by the consumer and 56 per cent of the price paid for lemons are absorbed by the transportation, wholesaling, and retailing agencies.

ORGANIZATION OF THE UNITED STATES DEPARTMENT OF AGRICULTURE.

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